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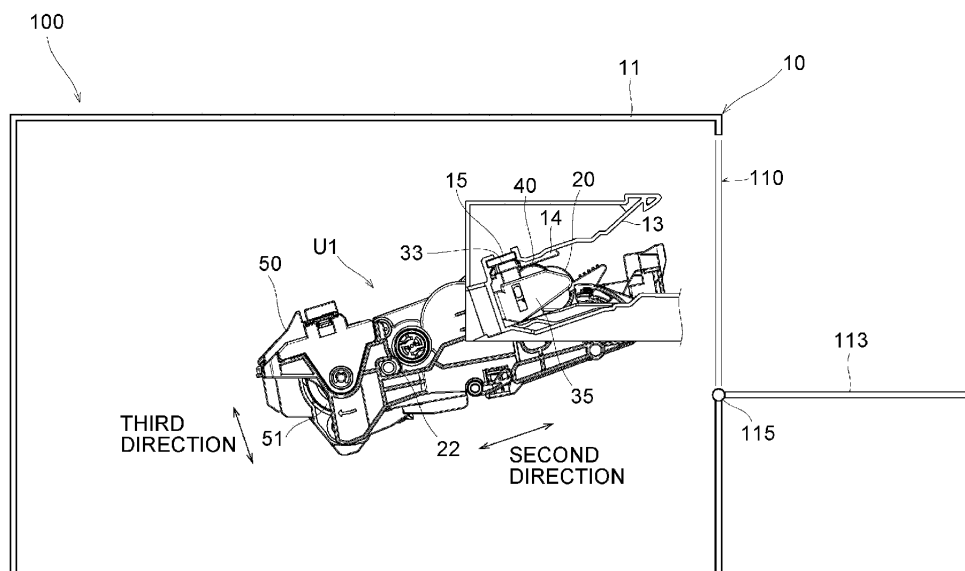
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DEVELOPING CARTRIDGE

- (57)

A developing cartridge includes a housing (21), a storage medium (31) having an electrical contact surface (33), a holder (34) holding the electrical contact surface (33) and movable with respect to the housing (21) between a first position and a second position, and a roller (40) including a first roller protrusion (41). The first roller protrusion (41) is movable between a third position
- and a fourth position in accordance with rotation of the roller (40). The holder (34) is movable in accordance with movement of the first roller protrusion (41). As the first roller protrusion (41) moves from the third position to the fourth position, the holder (34) moves from the first position to the second position.

FIG. 1



Description

[0001] The present disclosure relates to a developing cartridge.

[0002] Conventionally, there is known a developing cartridge including a storage medium, a holder, a holder cover, a gear cover, and a casing. The developing memory is held by a holder. The holder is held by the holder cover. The holder is movable with respect to the holder cover. The holder cover is fixed to the casing via the gear cover. The gear cover covers the gear. The casing is configured to store developer.

[0003] The holder includes a first member, a second member, and an elastic member. The elastic member is disposed between the first member and the second member. The holder is expandable and contractible by an elastic member. In the process of attaching the developing cartridge to the image forming apparatus, the holder is extended by the elastic member, so that the electrical contact surface of the developing cartridge is brought into contact with the main body electrical contact of the image forming apparatus.

[0004] It is desirable to reduce friction of an electrical contact surface of a developing cartridge against a main body electrical contact of an image forming apparatus by a method different from a conventional technique.

[0005] An object of the present disclosure is to provide a technique capable of reducing friction between an electrical contact surface of a developing cartridge and an image forming apparatus.

[0006] According to an aspect of the present disclosure, there is provided a developing cartridge including a housing, a developing roller, a storage medium, and a holder. The housing is configured to store developer. The developing roller is rotatable about a first axis extending in a first direction. The developing roller is positioned at one end portion of the housing in a second direction intersecting the first direction. The storage medium has an electrical contact surface. The holder is positioned at one end portion of the housing in the first direction. The holder holds the electrical contact surface. The holder is movable with respect to the housing between a first position and a second position different from the first position in a third direction intersecting the electrical contact surface. The roller is rotatable about a second axis extending in the first direction. The roller includes a first roller protrusion extending in the first direction. The first roller protrusion is contactable with the holder. The first roller protrusion is movable between a third position and a fourth position according to rotation of the roller. The holder is movable along with the movement of the first roller protrusion. When the first roller protrusion moves from the third position to the fourth position, the holder moves from the first position to the second position.

[0007] That is, since the holder moves from the first position to the second position by the first roller protrusion of the roller moving from the third position to the fourth position, the movement of the electrical contact surface

can be controlled by the rotation of the roller. As a result, friction between the electrical contact surface and the main body electrical contact of the image forming apparatus can be reduced.

[0008] For example, when the first roller protrusion moves from the third position to the fourth position, the first roller protrusion lifts the holder from the first position to the second position.

[0009] Accordingly, the holder can be lifted by the rotation of the roller.

[0010] For example, the developing cartridge further includes a holder cover. For example, the holder cover holds the holder to be movable between the first position and the second position. For example, when the first roller protrusion moves from the third position to the fourth position, the holder moves from the first position to the second position such that the electrical contact surface moves away from the holder cover.

[0011] That is, the holder can be held by the holder cover.

[0012] For example, the holder cover covers at least a portion of the roller.

[0013] That is, the roller can be protected by the holder cover.

[0014] For example, the holder includes a holder protrusion extending in the first direction. For example, the holder cover has a groove into which the holder protrusion is inserted. For example, the groove extends in the third direction.

[0015] That is, it is possible to restrict the movement direction of the holder by the holder protrusion moving in the groove of the holder cover.

[0016] For example, the roller includes a roller main body and rubber. The rubber is located on an outer circumferential surface of the roller body.

[0017] That is, it is possible to increase the friction of the outer surface of the roller by the rubber.

[0018] For example, the holder has a first end portion and a second end portion. For example, the first end portion holds the electrical contact surface. For example, the second end portion is closer to the developing roller than the electrical contact surface in the third direction. For example, in a state where the first roller protrusion is located at the fourth position, the first roller protrusion is in contact with the second end portion.

[0019] For example, the developing cartridge further includes a gear cover. For example, the gear cover is positioned at one end portion of the housing in the first direction. For example, the gear cover holds the roller to be rotatable about the second axis.

[0020] That is, the roller can be held by the gear cover.

[0021] For example, the gear cover includes a gear cover protrusion extending in the first direction. For example, the gear cover protrusion overlaps with the second axis. For example, the roller has an insertion hole into which the gear cover protrusion is inserted.

[0022] For example, the roller is positioned between the gear cover and the holder in the first direction.

[0023] For example, the developing cartridge further includes a first protrusion extending in a direction intersecting the first direction. For example, when the first roller protrusion is located at the third position, the first roller protrusion is in contact with the first protrusion. For example, when the first roller protrusion is located at the fourth position, the first roller protrusion is separated from the first protrusion.

[0024] That is, since the first roller protrusion is in contact with the first protrusion in a state where the first roller protrusion is located at the third position, it is possible to restrict the first roller protrusion from further moving from the third position.

[0025] For example, the roller further includes a second roller protrusion extending in the first direction. For example, when the first roller protrusion is located at the third position, the second roller protrusion is separated from the first protrusion. For example, when the first roller protrusion is located at the fourth position, the second roller protrusion is in contact with the first protrusion.

[0026] That is, the second roller protrusion is in contact with the first protrusion in a state where the first roller protrusion is located at the fourth position. As a result, the first roller protrusion moved from the third position to the fourth position can be restricted from further moving.

[0027] For example, the first protrusion is positioned between the first roller protrusion and the second roller protrusion in the second direction.

[0028] That is, the rotation of the roller can be restricted by the first roller protrusion and the second roller protrusion coming into contact with the first protrusion by the rotation of the roller.

[0029] For example, the developing cartridge is attachable to an image forming apparatus. For example, when the developing cartridge is attached to the image forming apparatus, the first roller protrusion rotates from the third position to the fourth position in a state where the outer circumferential surface of the roller is in contact with the image forming apparatus.

FIG. 1 is a schematic overall view of an image forming apparatus according to an embodiment;

FIG. 2 is a perspective view of the developing cartridge according to the embodiment;

FIG. 3 is an exploded perspective view showing one end portion of the developing cartridge in the first direction;

FIG. 4 is a perspective view showing one end portion of the developing cartridge;

FIG. 5 is a side view showing one end portion of the developing cartridge in the first direction;

FIG. 6 is a perspective view showing one end portion of the developing cartridge;

FIG. 7 is a side view showing one end portion of the developing cartridge in the first direction;

FIG. 8 is a side view showing a process of attaching the process unit to the main body frame of the image forming apparatus.

[0030] Hereinafter, embodiments of the present disclosure will be described with reference to the accompanying drawings. Note that components described in these embodiments are merely examples, and the scope of the present disclosure is not intended to be limited only to them. In the drawings, for ease of understanding, the size or the number of each part may be simplified and illustrated as necessary.

<1. Embodiment>

[0031] FIG. 1 is a schematic overall view of an image forming apparatus 100 according to an embodiment. The image forming apparatus 100 is an apparatus that forms an image on a print medium such as a print sheet. The image forming apparatus 100 includes an apparatus main body 10. The process unit U1 is attachable to the apparatus main body 10. The process unit U1 includes a developing cartridge 20 and a drum cartridge 50. The developing cartridge 20 is attachable to the drum cartridge 50.

[0032] In the following description, a direction in which a rotation axis (developing roller axis A22) of the developing roller 22 included in the developing cartridge 20 extends is referred to as a "first direction". A direction in which the developing roller 22 and the handle 213 are arranged is referred to as a "second direction". A direction intersecting the electrical contact surface 33 of the developing cartridge 20 will be referred to as a "third direction". The first direction intersects the second direction, and is preferably orthogonal to the second direction. The second direction intersects the third direction, and is preferably orthogonal to the third direction.

[0033] The apparatus main body 10 includes a box-shaped main body frame 11. The main body frame 11 has an opening 110. The opening 110 is positioned at an end portion of the main body frame 11 in the second direction. The main body frame 11 includes a main body cover 113. The main body cover 113 is positioned at an end portion of the main body frame 11 in the second direction. The main body frame 11 includes a hinge 115. The hinge 115 is positioned at an end portion of the main body cover 113 in the third direction. The main body cover 113 is movable about the hinge 115 between a closed position for closing the opening 110 and an open position for opening the opening 110. The process unit U1 is attachable to the main body frame 11 in a state where the opening 110 is open.

[0034] The main body frame 11 includes a guide frame 13. The guide frame 13 has a main body electrical contact 15. When the process unit U1 is attached to the image forming apparatus 100, the guide frame 13 comes into contact with the holder 34 of the developing cartridge 20. The guide frame 13 guides the holder 34 so that the holder 34 moves along a predetermined path. In a state where the process unit U1 is attached to the main body frame 11, the main body electrical contact 15 is in contact with the electrical contact surface 33 of the developing car-

tridges 20. Herein, the main body electrical contact 15 and the electrical contact surface 33 are referred to in singular form, but may also be in plural form, respectively. The main body electrical contact 15 is electrically connected to a main body control portion of the image forming apparatus 100. When the main body electrical contact 15 is in contact with the electrical contact surface 33, the main body control portion can read information from the developing memory 31 and write information to the developing memory 31.

<Developing Cartridge 20>

[0035] FIG. 2 is a perspective view of the developing cartridge 20 according to the embodiment. FIG. 3 is an exploded perspective view illustrating one end portion of the developing cartridge 20 in the first direction. FIG. 4 is a perspective view illustrating one end portion of the developing cartridge 20 in the first direction. FIG. 5 is a side view illustrating one end portion of the developing cartridge 20 in the first direction. FIG. 6 is a perspective view illustrating one end portion of the developing cartridge 20 in the first direction. FIG. 7 is a side view illustrating one end portion of the developing cartridge 20 in the first direction.

[0036] FIGS. 4 and 6 illustrate a state in which a holder cover 35 included in the developing cartridge 20 is removed. FIGS. 5 and 7 are cross-sectional views of the holder cover 35 taken along a plane perpendicular to the first direction.

[0037] As shown in FIG. 2, the developing cartridge 20 includes a housing 21 and a developing roller 22. The housing 21 is capable of accommodating the developer. The developer is, for example, toner. The housing 21 extends in the first direction. The housing 21 has a handle 213. The developing roller 22 is positioned at one end portion of the housing 21 in the second direction. The handle 213 is positioned at the other end portion of the housing 21 in the second direction.

[0038] The developing roller 22 is rotatable about a developing roller axis A22 extending in the first direction in a state where the developing cartridge 20 is attached in the image forming apparatus 100. The developing roller axis A22 is an example of a "first axis". In a state where the developing cartridge 20 is attached in the image forming apparatus 100, the developing roller 22 supplies the developer in the housing 21 to the surface of the photo-sensitive drum 51 of the drum cartridge 50.

<Gear Cover 28>

[0039] The developing cartridge 20 includes a gear cover 28. The gear cover 28 is positioned at one end portion of the housing 21 in the first direction. The gear cover 28 is attached to one end portion of the housing 21 in the first direction. The gear cover 28 covers a gear of the developing cartridge 20.

<Developing Memory Unit 30>

[0040] The developing cartridge 20 includes a developing memory unit 30. As shown in FIG. 3, the developing memory unit 30 includes a developing memory 31, a holder 34, and a holder cover 35. The developing memory unit 30 is positioned at one end portion of the gear cover 28 in the first direction.

10 < Developing Memory 31>

[0041] The developing memory 31 stores various kinds of information related to the developing cartridge 20. The developing memory 31 stores, for example, identification information and/or lifetime information. The identification information is information for identifying each developing cartridge 20, and is, for example, a serial number. The life information includes, for example, a cumulative number of rotations obtained by accumulating the number of rotations of the developing roller 22, a cumulative number of printed sheets obtained by accumulating the number of printed sheets using the developing roller 22, and/or a cumulative number of dots obtained by accumulating the number of dots of the developing roller 22. In other words, the cumulative number of rotations is a cumulative value of the number of rotations of the developing roller 22 from a brand-new state. The developing memory 31 is an example of a "storage medium".

[0042] The developing memory 31 includes a developing substrate 32, an electrical contact surface 33, and a storage element 310. The developing substrate 32 is a plate-like member. The electrical contact surface 33 is located at one end portion of the developing substrate 32 in the third direction. The electrical contact surface 33 is electrically connected to the storage element 310. As shown in FIG. 1, in a state where the developing cartridge 20 is attached to the main body frame 11, the electrical contact surface 33 intersects the third direction. The electrical contact surface 33 is movable with respect to the housing 21 at least in the third direction.

<Holder 34>

[0043] The holder 34 is positioned at one end portion of the housing 21 in the first direction. The holder 34 is positioned between the developing roller 22 and the handle 213 in the second direction. The holder 34 holds the electrical contact surface 33 by holding the developing substrate 32 of the developing memory 31. The developing memory 31 is positioned at one end portion of the holder 34 in the third direction.

[0044] The holder 34 is movable with respect to the housing 21 and the gear cover 28 between a first position P1 shown in FIGS. 4 and 5 and a second position P2 shown in FIGS. 6 and 7. In the third direction, the second position P2 is different from the first position P1. In the process of attaching the process unit U1 in the image forming apparatus 100, the holder 34 is preferably dis-

posed at the first position P1 by the weights of the holder 34 and the developing memory 31. In the present embodiment, the first position P1 is a position separated downward from the second position P2.

[0045] The holder 34 includes a holder protrusion 341 extending in the first direction. The holder protrusion 341 is positioned at one end portion of the holder 34 in the first direction.

<Holder Cover 35>

[0046] The holder cover 35 is positioned at one end portion of the gear cover 28 in the first direction.

[0047] The holder cover 35 is attached to the gear cover 28 by a plurality of screws. The holder cover 35 holds the holder 34 movably between the first position P1 and the second position P2.

[0048] When the first roller protrusion 41 moves from the third position P3 to the fourth position P4, the holder 34 moves from the first position P1 to the second position P2 such that the electrical contact surface 33 moves away from the holder cover 35.

[0049] The holder cover 35 has a groove 351. The groove 351 is a through-hole penetrating the holder cover 35 in the first direction. The groove 351 extends in the third direction. The length of the holder protrusion 341 in the second direction is smaller than the length of the groove 351 in the second direction. In the second direction, the holder protrusion 341 is inserted into the groove 351 in a state where there is a spatial margin. Therefore, the holder protrusion 341 is movable in the third direction with respect to the holder cover 35. When the holder 34 moves in the third direction with respect to the holder cover 35, the holder protrusion 341 moves in the third direction inside the groove 351. By inserting the holder protrusion 341 into the groove 351, the direction in which the holder 34 can move is restricted.

<Roller 40>

[0050] The developing cartridge 20 includes a roller 40. The roller 40 is positioned at one end portion of the gear cover 28 in the first direction. The roller 40 is rotatable with respect to the housing 21 and the gear cover 28 about a roller axis A40 (second axis) extending in the first direction. The roller 40 has a circular cross-section and has a width in the first direction. The roller 40 may comprise a hollow cylinder. The roller 40 may have a cross-section with a shape different from a circular shape, such as an elliptical shape or a fan shape.

[0051] As shown in FIG. 2, the roller 40 is positioned between the gear cover 28 and the holder 34 in the first direction. The holder cover 35 covers at least a part of the roller 40. Therefore, the holder cover 35 protects the roller 40.

[0052] The gear cover 28 rotatably holds the roller 40 with respect to the roller axis A40. More specifically, the gear cover 28 has a gear cover protrusion 281. The gear

cover protrusion 281 is positioned at one end portion of the gear cover 28 in the first direction. The gear cover protrusion 281 extends in the first direction. As shown in FIG. 3, the roller 40 has an insertion hole 40H penetrating in the first direction. The gear cover protrusion 281 is inserted into the insertion hole 40H. The roller 40 is rotatable about the gear cover protrusion 281. The gear cover protrusion 281 overlaps with the roller axis A40 in the first direction. The roller 40 rotates about the gear cover protrusion 281.

[0053] As shown in FIG. 3, the roller 40 includes a first roller protrusion 41 and a second roller protrusion 42. The first roller protrusion 41 and the second roller protrusion 42 are positioned at one end portion of the roller 40 in the first direction.

[0054] The first roller protrusion 41 extends in the first direction. The first roller protrusion 41 is contactable with the holder 34. As the roller 40 rotates, the first roller protrusion 41 is movable between a third position P3 shown in FIGS. 4 and 5 and a fourth position P4 shown in FIGS. 6 and 7. The holder 34 is movable along with the movement of the first roller protrusion 41. When the first roller protrusion 41 moves from the third position P3 to the fourth position P4, the holder 34 moves from the first position P1 to the second position P2. In the present embodiment, when the first roller protrusion 41 moves from the third position P3 to the fourth position P4, the first roller protrusion 41 lifts the holder 34 from the first position P1 to the second position P2. In other words, the second position P2 is a position separated vertically upward from the first position P1.

[0055] As shown in FIGS. 5 and 7, the holder 34 has a first end portion 343 and a second end portion 344. The first end portion 343 holds the electrical contact surface 33. The second end portion 344 is located closer to the developing roller 22 than the electrical contact surface 33 in the third direction. As shown in FIG. 5, in a state where the first roller protrusion 41 is located at the third position P3, the first roller protrusion 41 is separated from the second end portion 344. As shown in FIG. 7, in a state where the first roller protrusion 41 is located at the fourth position P4, the first roller protrusion 41 is in contact with the second end portion 344.

[0056] As shown in FIGS. 5 and 7, the holder cover 35 has a cover protrusion 353. The cover protrusion 353 extends in a direction intersecting the first direction. As shown in FIGS. 5 and 7, the cover protrusion 353 extends in the third direction. As shown in FIGS. 5 and 7, the cover protrusion 353 is positioned between the first roller protrusion 41 and the second roller protrusion 42 in the second direction.

[0057] As shown in FIG. 5, in a state where the first roller protrusion 41 is located at the third position P3, the first roller protrusion 41 is in contact with the cover protrusion 353. As shown in FIG. 7, in a state where the first roller protrusion 41 is located at the fourth position P4, the first roller protrusion 41 is separated from the cover protrusion 353. The cover protrusion 353 is an example

of a "first protrusion".

[0058] As shown in FIG. 5, in a state where the first roller protrusion 41 is located at the third position P3, the second roller protrusion 42 is separated from the cover protrusion 353. As shown in FIG. 7, in a state where the first roller protrusion 41 is located at the fourth position P4, the second roller protrusion 42 is in contact with the cover protrusion 353. Thus, rotation of the first roller protrusion 41 is restricted.

[0059] As shown in FIG. 3, the roller 40 includes a rubber 43 and a roller body 400. The rubber 43 is positioned on the outer circumferential surface of the roller body 400. The roller body 400 is made of, for example, resin. The outer circumferential surface of the roller body 400 is recessed in a direction towards the roller axis A40 in the radial direction. The radial direction is a direction orthogonal to the roller axis A40. The rubber 43 is fitted into the concave outer circumferential surface of the roller body 400. The rubber 43 has, for example, an annular shape. The rubber 43 is rotatable together with the roller body 400 about the roller axis A40.

<Description at Time of Attaching>

[0060] FIG. 8 is a side view showing a process of attaching the process unit U1 in the image forming apparatus 100. In FIG. 8, only a part of a main body frame 11 of the image forming apparatus 100 is illustrated. As shown in FIG. 8, the process unit U1 is inserted into the main body frame 11 in the second direction.

[0061] The main body frame 11 has a frame protrusion 14. The frame protrusion 14 extends in the second direction. The frame protrusion 14 protrudes from the guide frame 13 in the third direction. The width of the frame protrusion 14 in the first direction is less than the width of the roller 40 in the first direction. In the process of inserting the process unit U1 into the main body frame 11, the rubber 43 positioned on the outer circumferential surface of the roller 40 comes into contact with the frame protrusion 14.

[0062] When the process unit U1 is further inserted into the main body frame 11 in a state where the rubber 43 of the roller 40 is in contact with the frame protrusion 14, the roller 40 rotates while being in contact with the frame protrusion 14. At this time, a frictional force acts between the roller 40 and the frame protrusion 14 by the rubber 43. This frictional force causes the roller 40 to properly rotate.

[0063] When the roller 40 starts to rotate in a state where the first roller protrusion 41 of the roller 40 is at the third position P3 (see FIG. 5), the first roller protrusion 41 starts to rotate toward the fourth position P4 (see FIG. 7). Before the first roller protrusion 41 reaches the fourth position P4, the first roller protrusion 41 comes into contact with the holder 34. Hereinafter, the position of the first roller protrusion 41 when the first roller protrusion 41 comes into contact with the holder 34 is referred to as a "contact position". In a process in which the first roller

protrusion 41 rotates from the contact position toward the fourth position P4, the first roller protrusion 41 pushes the holder 34 toward one side in the third direction. As a result, the holder 34 starts to move from the first position P1 toward the second position P2. Further, in a state where the first roller protrusion 41 reaches the fourth position P4, the holder 34 reaches the second position P2.

[0064] When the holder 34 is located at the second position P2, the electrical contact surface 33 of the developing memory 31 held by the holder 34 is in contact with the main body electrical contact 15 of the image forming apparatus 100. Thus, the developing memory 31 and the main body control portion of the image forming apparatus 100 are electrically connected to each other. When the holder 34 is located at the second position P2, the first roller protrusion 41 of the roller 40 pushes the holder 34 in the third direction, so that the electrical contact surface 33 is pressed against the main body electrical contact 15. Thus, the electrical contact surface 33 stably comes into contact with the main body electrical contact 15.

[0065] According to the developing cartridge 20, when the first roller protrusion 41 of the roller 40 rotates from the third position P3 to the fourth position P4, the holder 34 moves from the first position P1 to the second position P2. This movement of the holder 34 causes the electrical contact surface 33 of the developing memory 31 to move in the third direction. Therefore, the movement of the electrical contact surface 33 can be controlled by the rotation of the roller 40.

[0066] Further, the electrical contact surface 33 moves in the third direction and comes into contact with the main body electrical contact 15. Therefore, friction between the electrical contact surface 33 and the main body electrical contact 15 can be reduced as compared with the case where the electrical contact surface 33 contacts the main body electrical contact 15 without moving in the third direction.

[0067] While the first roller protrusion 41 moves from the third position P3 to the fourth position P4 due to the rotation of the roller 40, the first roller protrusion 41 lifts the holder 34 from the first position P1 to the second position P2. As a result, the electrical contact surface 33 of the developing memory 31 can be lifted without incorporating a spring into the holder.

[0068] The first roller protrusion 41 of the roller 40 lifts the holder 34 to bring the electrical contact surface 33 of the developing memory 31 into contact with the main body electrical contact 15. As a result, in the process of attaching the process unit U1 to the image forming apparatus 100, it is possible to reduce the interference of the developing memory 31 with the guide frame 13 and the like located in front of the main body electrical contact 15, thereby reducing the operation load.

[0069] Since the rubber 43 is elastically deformed, the friction can be increased. Thus, the roller 40 can be rotated. In addition, since the rubber 43 is elastically deformed, the force with which the first roller protrusion 41

lifts the holder 34 can be adjusted to an appropriate magnitude. Thus, the electrical contact surface 33 can be brought into contact with the main body electrical contact 15 with an appropriate force.

[0070] The roller 40 is rotatably held by the gear cover protrusion 281. Therefore, when the process unit U1 is attached in the image forming apparatus 100, the first roller protrusion 41 of the roller 40 comes into contact with the cover protrusion 353 due to the weight of the roller 40. Accordingly, when the process unit U1 is attached to the image forming apparatus 100, the first roller protrusion 41 can be stably disposed at the predetermined third position P3.

[0071] Further, when the process unit U1 is attached to the image forming apparatus 100, the first roller protrusion 41 is disposed at the third position P3. Therefore, the movement amount (rotation amount) of the first roller protrusion 41 at the time of attachment can be made constant. Therefore, even when the process unit U1 is repeatedly attached and detached, the electrical contact surface 33 can be appropriately brought into contact with the main body electrical contact 15 every time.

[0072] In the process of pulling out the process unit U1 from the image forming apparatus 100, the first roller protrusion 41 is lowered by the reverse rotation of the roller 40. As a result, the electrical contact surface 33 of the developing memory 31 is separated from the main body electrical contact 15 by the weight of the developing memory 31 and the holder 34.

[0073] Preferably, the weight of the first roller protrusion 41 is greater than the weight of the second roller protrusion 42. By making the weight of the first roller protrusion 41 greater than the weight of the second roller protrusion 42, the second roller protrusion 42 can be separated from the cover protrusion 353 while the first roller protrusion 41 is in contact with the cover protrusion 353. In order to make the weight of the first roller protrusion 41 greater than the weight of the second roller protrusion 42, the volume of the first roller protrusion 41 may be made larger than the volume of the second roller protrusion 42. In order to make the volume of the first roller protrusion 41 larger than the volume of the second roller protrusion 42, as shown in FIG. 5, the cross-sectional area of the first roller protrusion 41 may be made larger than the cross-sectional area of the second roller protrusion 42. In addition, the length of the first roller protrusion 41 may be greater than the length of the second roller protrusion 42 in the first direction.

<2. Modification>

[0074] The present disclosure is not limited to the above-described embodiments, and various modifications are possible.

[0075] The roller 40 may not have the rubber 43 on the outer circumferential surface. For example, the roller 40 may include a fiber member having a large frictional force instead of the rubber 43. Alternatively, the roller body 400

made of resin may be brought into direct contact with the guide frame 13, and the roller 40 may be rotated by the frictional force of the roller body 400 alone.

[0076] The groove 351 may not be a through-hole but may be a portion having a concave shape into which the end portion of the holder protrusion 341 can be inserted.

[0077] It is not essential that the cover protrusion 353 is part of the holder cover 35. For example, the cover protrusion 353 may be a part of the gear cover 28. Further, the cover protrusion 353 may be a member attached to the gear cover protrusion 281.

[0078] In the above-described embodiment, the developing memory 31 having the electrical contact surface 33 is held on the outer surface of the holder 34. However, the electrical contact surface 33 may be held on the outer surface of the holder 34, and the storage element 310 may be disposed at another position of the developing cartridge 20.

[0079] In the embodiment described above, the second position P2 is a position separated from the first position P1 in the vertically upward direction. However, the second position P2 may be a position separated vertically downward from the first position P1. Further, the second position P2 may be the same position as the first position P1 in the vertical direction and may be a position horizontally separated from the first position P1. Further, the second position P2 may be a position horizontally and vertically separated from the first position P1.

[0080] Although the present disclosure has been described in detail, the above description is illustrative in all aspects, and the present disclosure is not limited thereto. It is understood that numerous non-illustrated variations may be made without departing from the scope of this disclosure. The configurations described in the above embodiments and modifications may be combined or omitted as long as they do not contradict each other.

Claims

1. A developing cartridge (20) comprising :

- a housing (21) configured to accommodate a developer;
- a developing roller (22) rotatable about a first axis (A22) extending in a first direction, the developing roller (22) being positioned at one end portion of the housing (21) in a second direction intersecting the first direction;
- a storage medium (31) having an electrical contact surface (33);
- a holder (34) positioned at one end portion of the housing (21) in the first direction, the holder (34) holding the electrical contact surface (33), the holder (34) being movable relative to the housing (21) between a first position and a second position different from the first position in a third direction intersecting the electrical contact

- surface (33); and
 a roller (40) rotatable about a second axis (A40) extending in the first direction, the roller (40) including a first roller protrusion (41) extending in the first direction, the first roller protrusion (41) being contactable with the holder (34);
 the first roller protrusion (41) is movable between a third position and a fourth position in accordance with rotation of the roller (40), the holder (34) is movable in accordance with movement of the first roller protrusion (41), and when the first roller protrusion (41) moves from the third position to the fourth position, the holder (34) moves from the first position to the second position.
2. The developing cartridge (20) according to claim 1, wherein, when the first roller protrusion (41) moves from the third position to the fourth position, the first roller protrusion (41) lifts the holder (34) from the first position to the second position.
 3. The developing cartridge (20) according to claim 1 or 2, further comprising a holder cover (35) configured to hold the holder (34) to be movable between the first position and the second position, and wherein, when the first roller protrusion (41) moves from the third position to the fourth position, the holder (34) moves from the first position to the second position such that the electrical contact surface (33) moves away from the holder cover (35).
 4. The developing cartridge (20) according to claim 3, wherein the holder cover (35) covers at least a part of the roller (40).
 5. The developing cartridge (20) according to claim 3 or 4, wherein the holder (34) includes a holder protrusion (341) extending in the first direction, and wherein the holder cover (35) includes a groove (351) into which the holder protrusion (341) is inserted, the groove (351) extending in the third direction.
 6. The developing cartridge (20) according to any one of the previous claims, wherein the roller (40) includes a roller body (400) and a rubber (43) which is located on an outer circumferential surface of the roller body (400).
 7. The developing cartridge (20) according to any one of the previous claims, wherein the holder (34) includes:
 - a first end portion (343) holding the electrical contact surface (33); and
 - a second end portion (344) closer to the developing roller (22) than the electrical contact surface (33) in the third direction, and
- in a state where the first roller protrusion (41) is located at the fourth position, the first roller protrusion (41) is in contact with the second end portion (344).
8. The developing cartridge (20) according to any one of the previous claims, further comprising a gear cover (28) positioned at one end portion of the housing (21) in the first direction, the gear cover (28) holding the roller (40) so as to be rotatable about the second axis (A40).
 9. The developing cartridge (20) according to claim 8, wherein the gear cover (28) includes a gear cover protrusion (281) extending in the first direction and overlapping with the second axis (A40), and wherein the roller (40) has an insertion hole into which the gear cover protrusion (281) is inserted.
 10. The developing cartridge (20) according to claim 8 or 9, wherein the roller (40) is positioned between the gear cover (28) and the holder (34) in the first direction.
 11. The developing cartridge (20) according to any one of the previous claims, further comprising a first protrusion extending in a direction intersecting the first direction, wherein, when the first roller protrusion (41) is located at the third position, the first roller protrusion (41) is in contact with the first protrusion (41), and wherein, when the first roller protrusion (41) is located at the fourth position, the first roller protrusion (41) is separated from the first protrusion.
 12. The developing cartridge (20) according to claim 11, wherein the roller (40) further includes a second roller protrusion (42) extending in the first direction, wherein, when the first roller protrusion (41) is located at the third position, the second roller protrusion (42) is separated from the first protrusion, and wherein when the first roller protrusion (41) is located at the fourth position, the second roller protrusion (42) is in contact with the first protrusion.
 13. The developing cartridge (20) according to claim 12, wherein the first protrusion is positioned between the first roller protrusion (41) and the second roller protrusion (42) in the second direction.
 14. The developing cartridge (20) according to any one of the previous claims, wherein the developing cartridge (20) is attachable to an image forming apparatus (100), and wherein, when the developing cartridge (20) is attached in the image forming apparatus (100), the first roller protrusion (41) rotates from the third position to the fourth position in a state where the outer circumferential surface of the roller (40) is in contact with the image forming apparatus (100).

FIG. 1

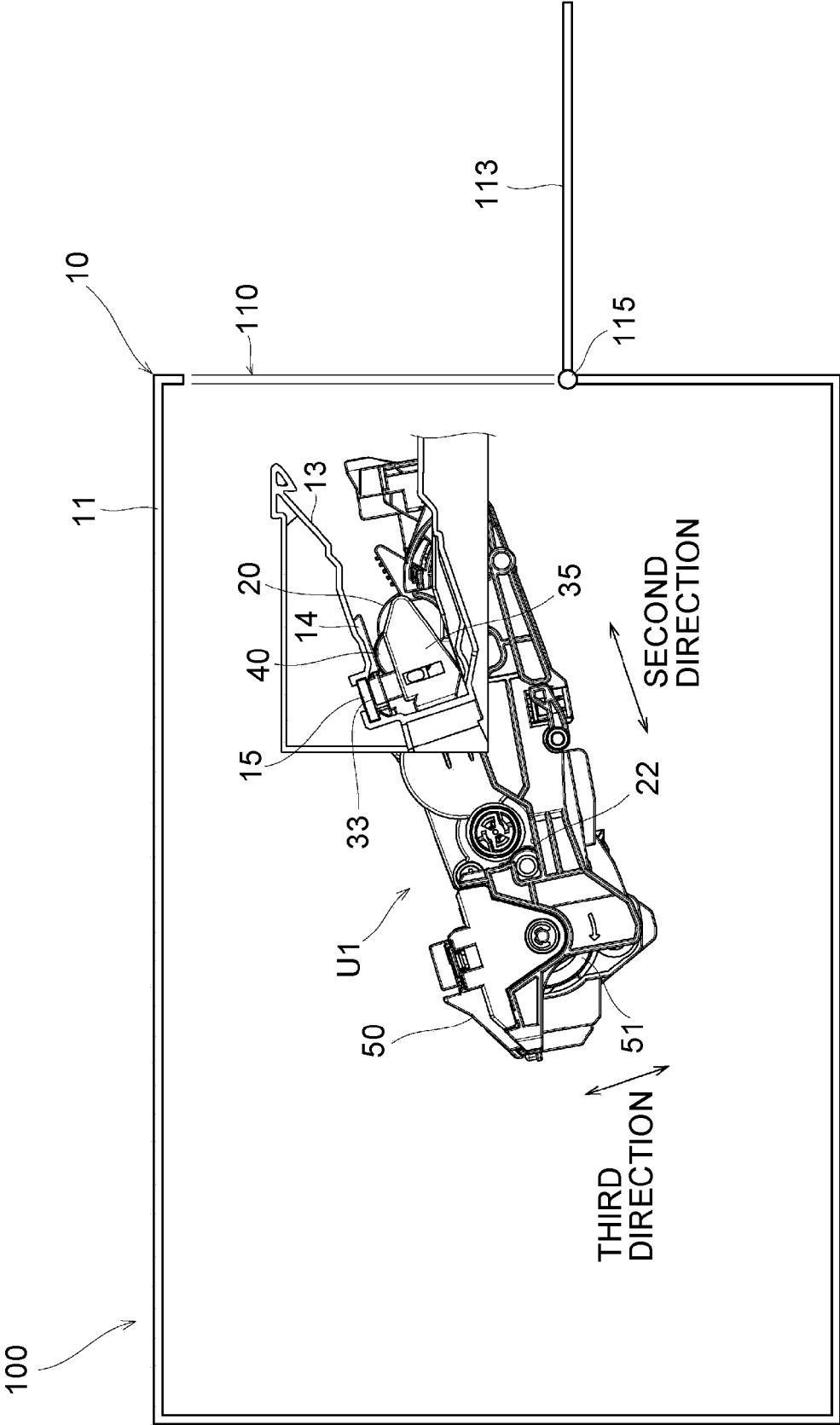


FIG. 2

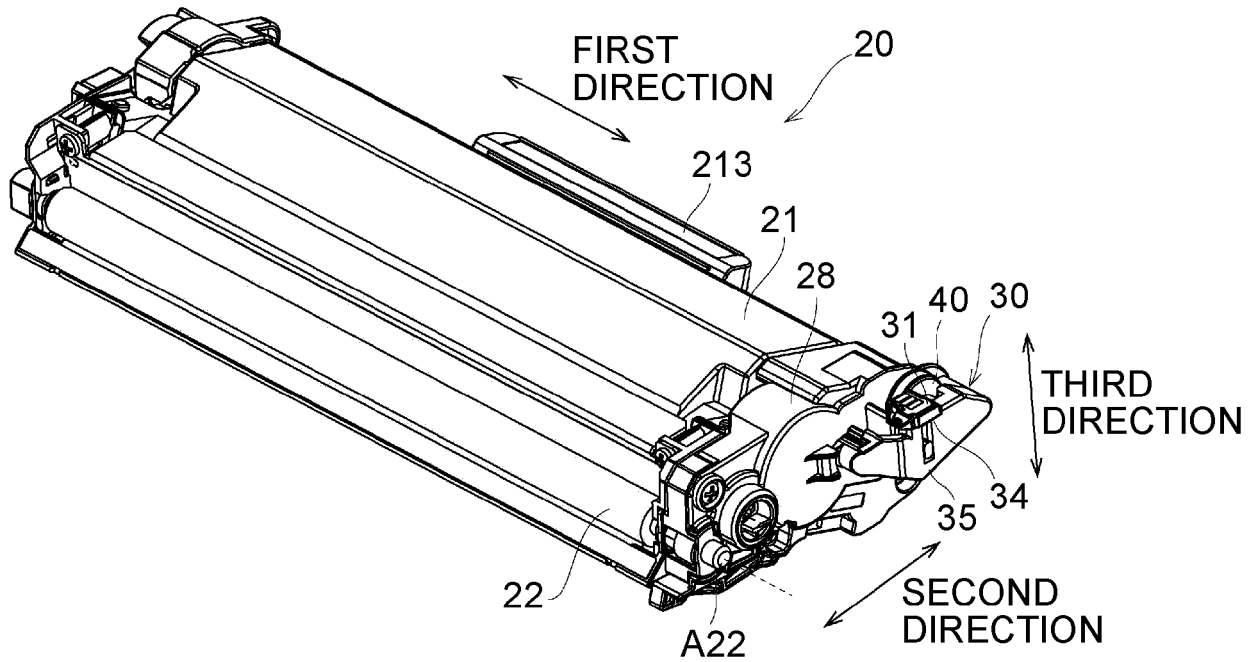


FIG. 3

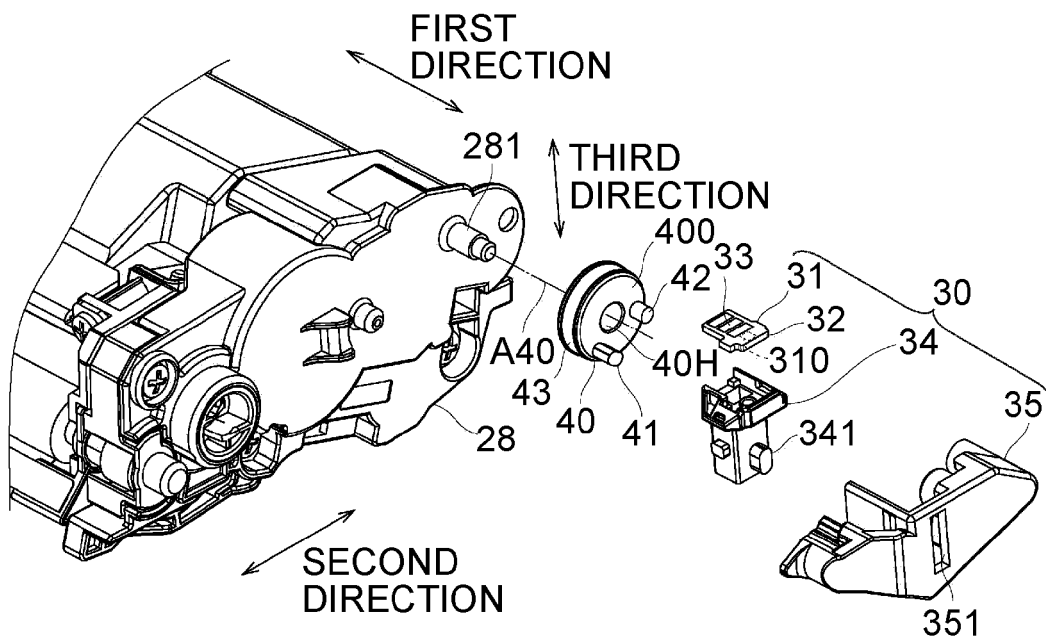


FIG. 4

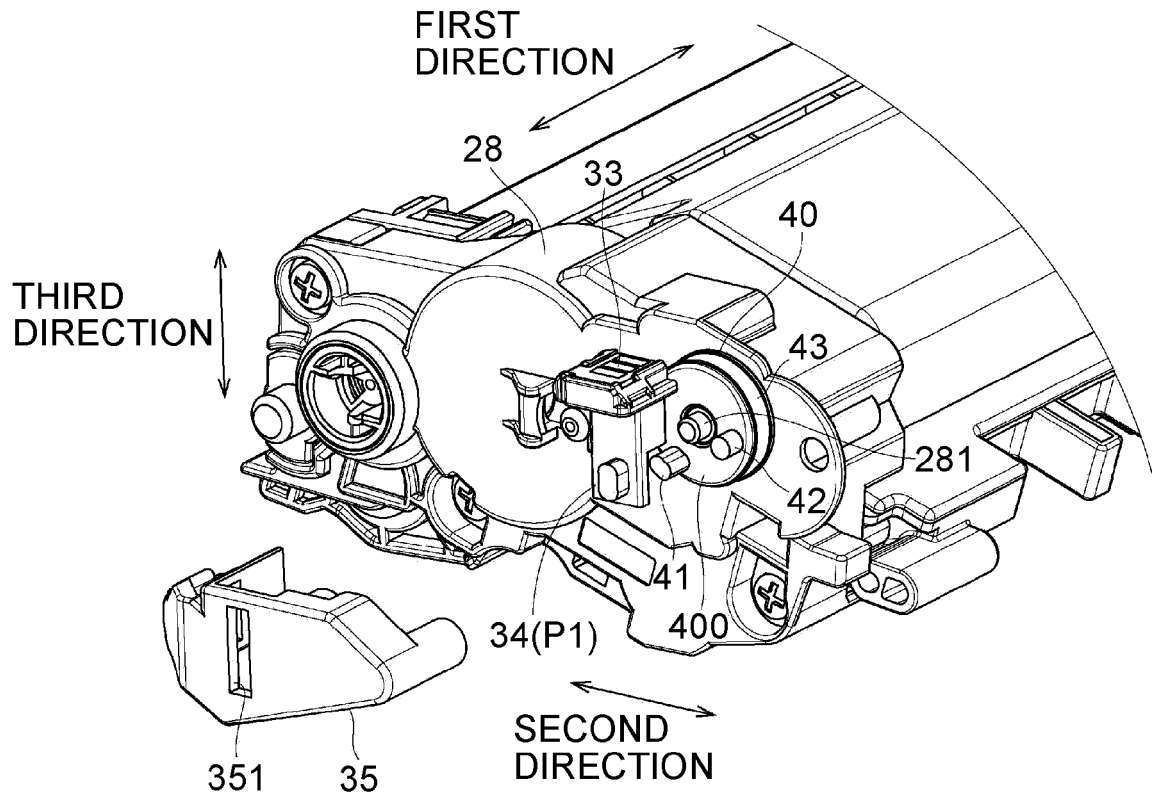


FIG. 5

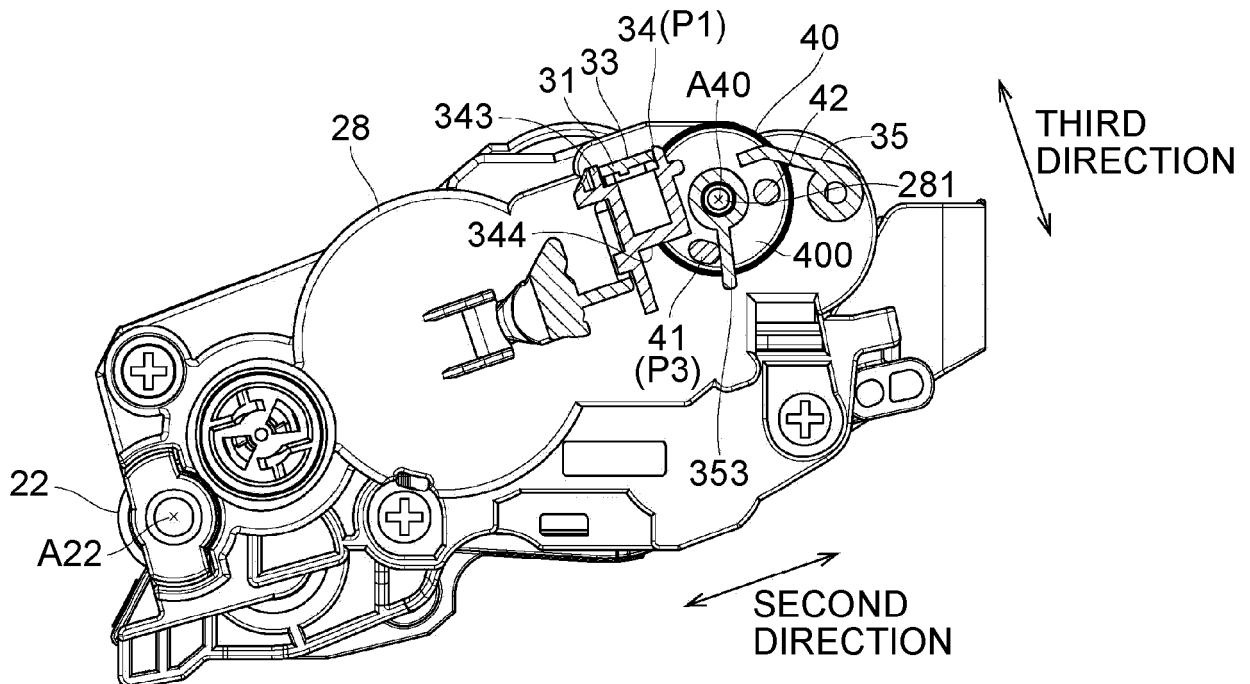


FIG. 6

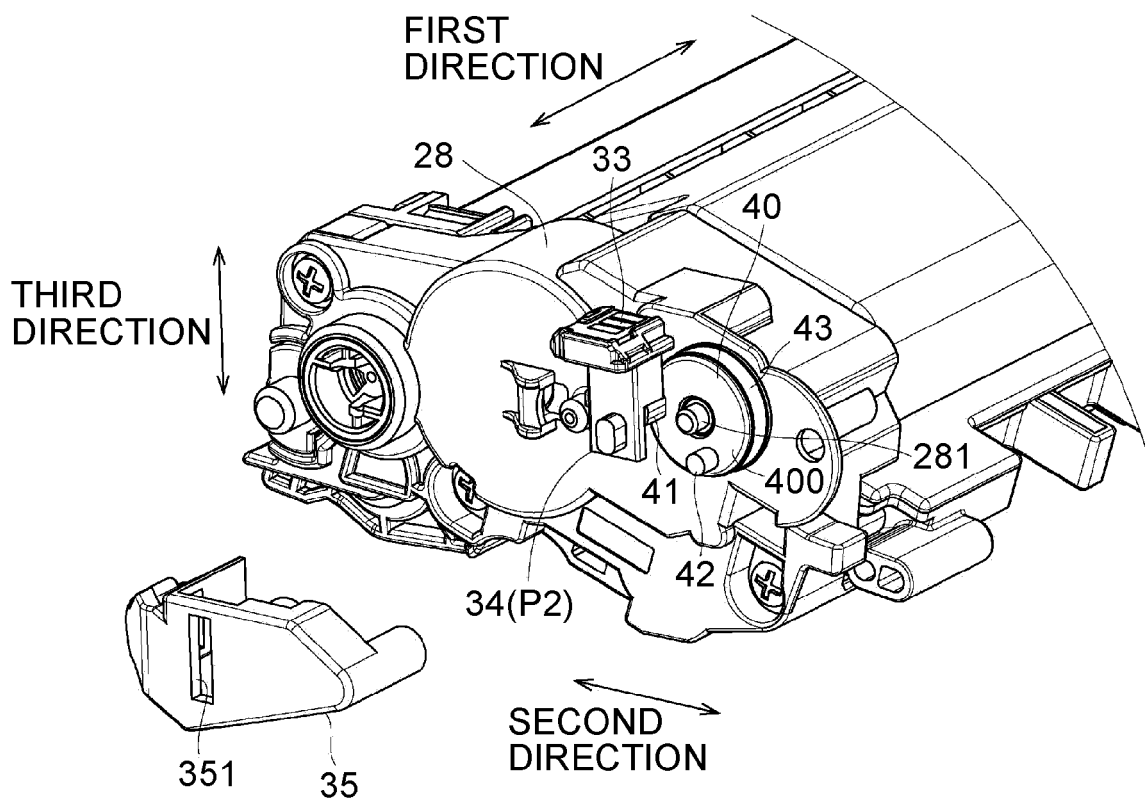


FIG. 7

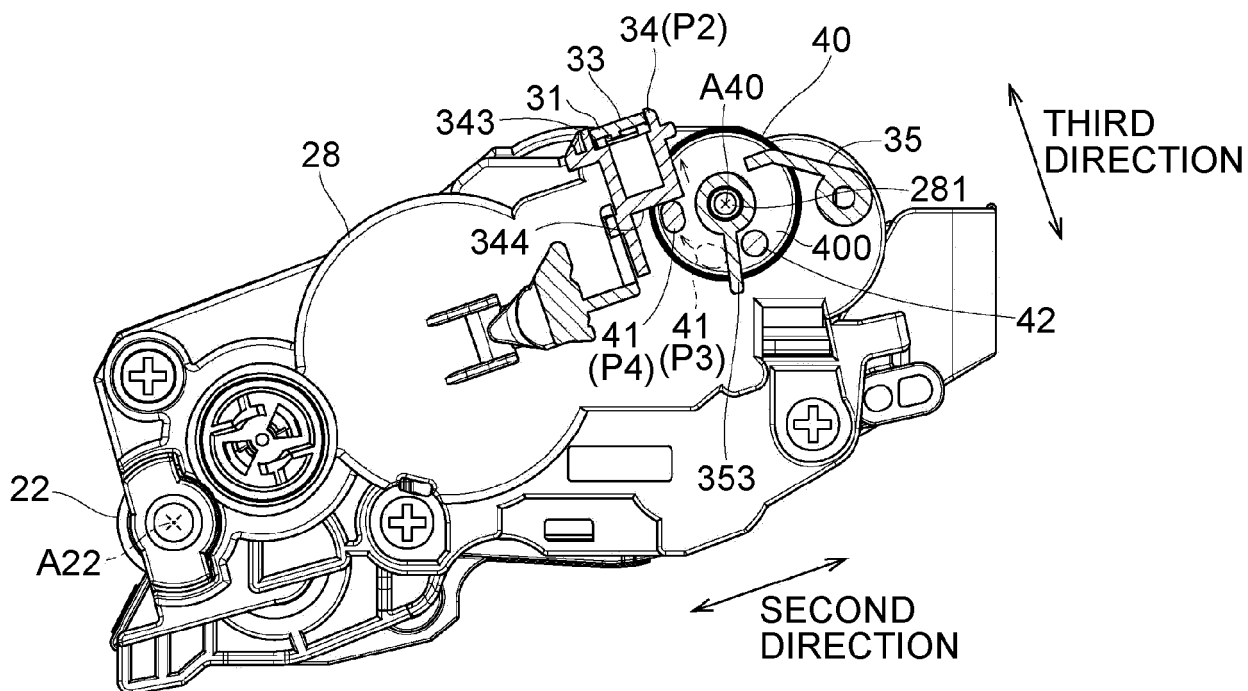
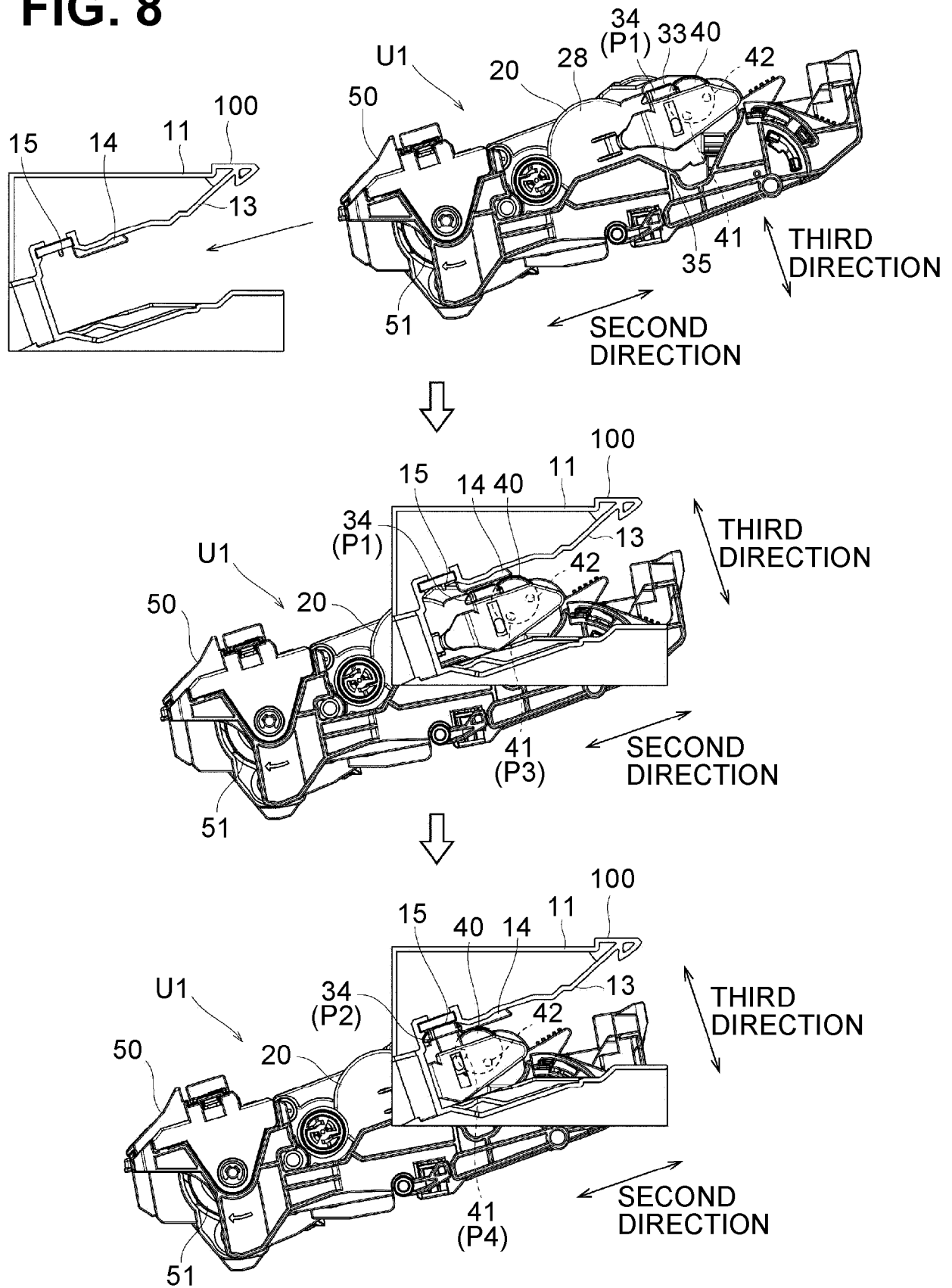


FIG. 8





EUROPEAN SEARCH REPORT

Application Number

EP 23 18 5255

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			G03G
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Place of search Munich	Date of completion of the search 28 November 2023	Examiner Mandreoli, Lorenzo
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document		

**ANNEX TO THE EUROPEAN SEARCH REPORT
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